

Claims

1. Method for determining the signal-to-noise ratio (OSNR) of arbitrarily polarized optical signals (S) of different wavelength which are combined to form a WDM signal, according to a polarization nulling method, characterized in that power spectra (LS) of the WDM signal for a first defined setting $m = 1$ ($m = 1, 2, \dots M$) of a first polarization-optical phase controller (E1) and for N ($n = 1, 2, \dots N$) settings of a second polarization-optical phase controller (E2) are recorded and stored, from the power spectra (LS) a maximum deviation (A_1) is determined for the optical signals (S) and stored, the power spectra (LS) of the WDM signal for $(M-1)$ new settings of the first phase controller (E1) and for N settings in each case of the second phase controller (E2) are then recorded and stored, from these stored power spectra (LS) for each setting of the first phase controller (E1) the maximum deviations (A_m) with $m = 1, 2 \dots (M-1)$ of the signals are determined and stored, and on the basis of all deviations ($A_1, A_2, \dots A_M$) the signal-to-noise ratio (OSNR) is calculated for the optical signals (S).
2. Method according to Claim 1, characterized in that the deviation (A_m) ($i=1, 2, \dots M$) of an optical signal (S) is determined by means of an interpolation.
3. Method according to Claim 1 or 2, characterized in that the signal power of the optical signal (S) is determined by means of interpolation of the squared deviations.

4. Method according to Claim 1, 2 or 3,
characterized in that
by measuring the power at the input of the polarization controller a
sum of the signal and noise power is determined from which a noise
5 power is determined by subtracting the determined signal power of
the optical signal (S).

5. Method according to one of the preceding Claims,
characterized in that

10 the number of polarization controller settings is selected on a
minimum basis depending on a specified relationship between
precision determination of the signal-to-noise ratio (OSNR) and
measurement time.

15 6. Method according to one of the preceding Claims,
characterized in that

the phase shifts between the components of the electrical field
vector of an optical signal (S) and the polarizer (POL) are
performed by means of phase retarder plates as polarization-optical
20 phase controllers, and the phase retarder plate (E1) can be set
using the rotation angles ($\delta_1, \delta_2, \dots, \delta_M$) and the phase retarder
plate (E2) can be set using the rotation angles ($\theta_1, \theta_2, \dots, \theta_N$).

7. Method according to Claim 6,

25 characterized in that
the settings of the first and second phase retarder plates (E1) and
(E2) are implemented in such a way that a first phase shift is set
for a first rotation angle (δ_1) of (E1) and a plurality N of angles
($\theta_1, \theta_2, \dots, \theta_N$) are set for (E2) from which a set of N power
30 values is recorded,
from these power values a first sinusoidal interpolation curve is
determined whose deviation (A_1) is stored in a table,
the settings of the angles ($\theta_1, \theta_2, \dots, \theta_N$) are repeated for
further rotation angles ($\delta_2, \dots, \delta_M$) with $m > 1$ for recording

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further power values from which further deviations ($A_2, \dots A_M$) are stored whose values are squared and interpolated with another sinusoidal curve (SIN) as a function of ($\delta_1, \delta_2, \dots, \delta_M$), the signal power of the optical signal is determined from the deviation of the sinusoidal curve (SIN), by means of which the signal-to-noise ratio (OSNR) is derived for the optical signals (S).

8. Method according to one of the preceding Claims, characterized in that

10 to record the power values of an optical signal (S) a resolution cell with a bandwidth equal to or less than the spectral width of a channel of a WDM signal is selected.

9. Device for determining the signal-to-noise ratio (OSNR) of arbitrarily polarized optical signals (S) of different wavelength which are combined to form a WDM signal, according to a polarization nulling method, wherein after passing through a first and a second polarization-optical phase controller (E1, E2) the optical signal (S) is injected into a linear polarizer (POL) with following optical spectrum analyzer (OSA),

20 characterized in that there is added to the optical spectrum analyzer (OSA) a memory unit (SE) for tabulating the power values of the spectra measured at the optical spectrum analyzer (OSA) for different settings of the phase controllers (E1, E2), and

25 there is connected to the optical spectrum analyzer (OSA) a determination unit (EE) for calculating the signal-to-noise ratio (OSNR) by interpolation and deviation searching of the power values recorded at the optical spectrum analyzer (OSA).

10. Device according to Claim 9,
characterized in that
the first polarization-optical phase controller (E1) is a $\lambda/4$ plate
and the second polarization-optical phase controller (E2) is a $\lambda/2$
5 plate.